WHAT IS CLAIMED IS:

1. An adaptive array antenna receiving apparatus which receives a CDMA transmitted signal by a plurality of antenna elements (1-1 to 1-N) forming an adaptive array antenna and which includes a predetermined number L of fingers, where L is an integer greater than one, said receiving apparatus comprising:

a predetermined number L of despreading means (3-1-1 to 3-L-N) forming said predetermined number of fingers, each of said predetermined number of despreading means being supplied with received signals from said antenna elements for despreading the received signals to produce despread signals;

a predetermined number L of weighting factor multiplying means (4-1 to 4-L) supplied with the despread signals from said predetermined number of despreading means, respectively, each of said predetermined number of weighting factor multiplying means being for multiplying the despread signals by weighting factors to produce a weighted signal;

combining means (6) supplied with the weighted signals from said predetermined number of weighting factor multiplying means for combining the weighted signals to produce a rake combined signal;

error signal producing means (8) supplied with the rake combined signal and a reference signal for calculating a difference between the rake combined signal and the reference signal to produce a common error signal representative of the difference; and

a predetermined number L of control means (5-1 through 5-L) supplied with the despread signals from said predetermined number of despreading means, respectively, and with the common error signal in common and connected to said predetermined number of weighting factor multiplying means, each of said predetermined number of control means being for

controlling the weighting factors for each of said predetermined number of weighting factor multiplying means so that a mean square of the common error signal is minimized.

2. An adaptive array antenna receiving apparatus as claimed in claim 1, wherein each of said predetermined number of control means uses an RLS (Recursive Least Square) algorithm as an adaptive update algorithm for controlling the weighting factors for each of said predetermined number of weighting factor multiplying means.

3. An adaptive array antenna receiving apparatus as claimed in claim 1, wherein said reference signal is a signal equivalent to a known pilot signal in case where each of the received signals is the known pilot signal.

4. An adaptive array antenna receiving apparatus as claimed in claim 3, further comprising deciding means (11) for making a data decision upon the rake combined signal produced by said rake combining means to produce a decision output signal and switching means (12) for selectively switching the decision output signal produced by said deciding means and the reference signal, said switching means being controlled so that, when the received signal is the pilot signal and when the received signal is a data signal other than the pilot signal, the reference signal and the decision output signal are selected, respectively, to be supplied to said error signal producing means.

5. An adaptive array antenna receiving apparatus as claimed in claim 1, wherein each of said predetermined number of control means controls the weighting factors for each of said predetermined number of weighting factor multiplying means by the use of an N-order (N being an integer not smaller than 2) correlation matrix in case where said antenna elements are N in number.

6. An adaptive array antenna receiving apparatus as claimed in claim 1, wherein said predetermined number of despreading means which form said predetermined number of fingers correspond to a predetermined number L of

paths of a multipath of the received signal from each of said antenna elements, said receiving apparatus further comprising delay means for delaying the received signal from each of said antenna elements by delay times corresponding to the paths of said multipath, respectively, to produce delayed signals which are supplied to corresponding ones of said predetermined number of despreading means, said corresponding ones of the predetermined number of despreading means corresponding to the paths of said multipath.

7. An adaptive array antenna receiving apparatus which receives a CDMA transmitted signal by a plurality of antenna elements (1-1 to 1-N) forming an adaptive array antenna and which includes a predetermined number L of fingers, where L is an integer greater than one, said receiving apparatus comprising:

a predetermined number L of despreading means (3-1-1 to 3-L-N) forming said predetermined number of fingers, each of said predetermined number of despreading means being supplied with received signals from said antenna elements for despreading the received signals to produce despread signals;

a predetermined number L of weighting factor multiplying means (4-1 to 4-L) supplied with the despread signals from said predetermined number of despreading means, respectively, each of said predetermined number of weighting factor multiplying means being for multiplying the despread signals by weighting factors to produce a weighted signal;

combining means (6) supplied with the weighted signals from said predetermined number of weighting factor multiplying means for combining the weighted signals;

a predetermined number L of control means (5-1 through 5-L) supplied with the despread signals from said predetermined number of despreading means, respectively, and connected to said predetermined number of weighting factor multiplying means, each of said predetermined number of

control means being for controlling the weighting factors for each of said predetermined number of weighting factor multiplying means.

8. An adaptive array antenna receiving apparatus as claimed in claim 7, wherein each of said predetermined number L of control means uses an SMI (Sample Matrix Inversion) algorithm as an adaptive update algorithm for controlling the weighting factors.

9. An adaptive array antenna receiving apparatus as claimed in claim 7, wherein each of said predetermined number of control means controls the weighting factors for each of said predetermined number of weighting factor multiplying means by the use of an N-order (N being an integer not smaller than 2) correlation matrix in case where said antenna elements are N in number.

10. An adaptive array antenna receiving apparatus as claimed in claim 7, wherein said predetermined number of despreading means forming said predetermined number of fingers correspond to a predetermined number L of paths of a multipath of the received signal from each of said antenna elements, said receiving apparatus further comprising delay means for delaying the received signal from each of said antenna elements by delay times corresponding to the paths of said multipath, respectively, to produce delayed signals which are supplied to corresponding ones of said predetermined number of despreading means, said corresponding ones of the predetermined number of despreading means corresponding to the paths of said multipath.

11. A receiving method for use in an adaptive array antenna receiving apparatus which receives a CDMA transmitted signal by a plurality of antenna elements (1-1 to 1-N) forming an adaptive array antenna and which includes first through L-th fingers, where L is an integer greater than one, said receiving method comprising:

first through L-th despreading steps (3-1-1 to 3-L-N) carried out in said first through said L-th fingers, each of said first through said L-th despreading steps being supplied with received signals from said antenna elements for despreading the received signals to produce despread signals;

first through L-th weighting factor multiplying steps (4-1 to 4-L) supplied with the despread signals from said first through said L-th despreading steps, respectively, each of said first through said L-th weighting factor multiplying steps being for multiplying the despread signals by weighting factors to produce a weighted signal;

a combining step (6) supplied with the weighted signals from said first through said L-th weighting factor multiplying steps for combining the weighted signals to produce a rake combined signal;

an error signal producing step (8) supplied with the rake combined signal and a reference signal for calculating a difference between the rake combined signal and the reference signal to produce a common error signal representative of the difference; and

first through L-th control steps (5-1 through 5-L) supplied with the despread signals from said first through said L-th despreading steps, respectively, and with the common error signal in common, each of said first through said L-th control steps being for controlling the weighting factors for each of said first through said L-th weighting factor multiplying steps so that a mean square of the common error signal is minimized.

12. A receiving method as claimed in claim 11, wherein each of said first through said L-th control steps uses an RLS (Recursive Least Square) algorithm as an adaptive update algorithm for controlling the weighting factors for each of said first through said L-th weighting factor multiplying steps.

13. A receiving method as claimed in claim 11, wherein said reference signal is a signal equivalent to a known pilot signal in case where each of the received signals is the known pilot signal.

14. A receiving method as claimed in claim 13, further comprising a deciding step (11) for making a data decision upon the rake combined signal produced by said rake combining step to produce a decision output signal and a switching step (12) for selectively switching the decision output signal produced by said deciding step and the reference signal, said switching step being controlled so that, when the received signal is the pilot signal and when the received signal is a data signal other than the pilot signal, the reference signal and the decision output signal are selected, respectively, to be supplied to said error signal producing step.

15. A receiving method as claimed in claim 11, wherein each of said first through said L-th control steps controls the weighting factors for each of said first through said L-th weighting factor multiplying steps by the use of an N-order (N being an integer not smaller than 2) correlation matrix in case where said antenna elements are N in number.

16. A receiving method as claimed in claim 11, wherein said first through said L-th fingers which carry out said first through said L-th despreading steps correspond to first through L-th paths of a multipath of the received signal from each of said antenna elements, said receiving method further comprising a delay step for delaying the received signal from each of said antenna elements by delay times corresponding to the paths of said multipath, respectively, to produce delayed signals which are supplied to corresponding ones of said first through said L-th despreading steps, said corresponding ones of the first through the L-th despreading steps corresponding to said first through said L-th paths of said multipath.

17. A receiving method for use in an adaptive array antenna receiving apparatus which receives a CDMA transmitted signal by a plurality of antenna elements (1-1 to 1-N) forming an adaptive array antenna and which includes first through L-th fingers, where L is an integer greater than one, said receiving method comprising:

first through L-th despreading steps (3-1-1 to 3-L-N) carried out in said first through said L-th fingers, each of said first through said L-th despreading steps being supplied with received signals from said antenna elements for despreading the received signals to produce despread signals;

first through L-th weighting factor multiplying steps (4-1 to 4-L) supplied with the despread signals from said first through said L-th despreading steps , respectively, each of said first through said L-th weighting factor multiplying steps being for multiplying the despread signals by weighting factors to produce a weighted signal;

a combining step (6) supplied with the weighted signals from said first through said L-th weighting factor multiplying means for combining the weighted signals;

first through L-th control steps (5-1 through 5-L) supplied with the despread signals from said first through said L-th despreading steps, respectively, each of said first through said L-th control steps being for controlling the weighting factors for each of said first through said L-th weighting factor multiplying steps.

18. A receiving method as claimed in claim 17, wherein each of said first through said L-th control steps uses an SMI (Sample Matrix Inversion) algorithm as an adaptive update algorithm for controlling the weighting factors.

19. A receiving method as claimed in claim 17, wherein each of said first through said L-th control steps controls the weighting factors for each of said first through said L-th weighting factor multiplying steps by the use of an N-order (N being an integer not smaller than 2) correlation matrix in case where said antenna elements are N in number.

20. A receiving method as claimed in claim 17, wherein said first through said L-th fingers which carries out said first through said L-th despreading steps correspond to first through L-th paths of a multipath of the received signal from each of said antenna elements, said receiving method

further comprising a delay step for delaying the received signal from each of said antenna elements by delay times corresponding to the paths of said multipath, respectively, to produce delayed signals which are supplied to corresponding ones of said first through said L-th despreading steps, said corresponding ones of the first through the L-th despreading steps corresponding to said first through said L-th paths of said multipath.